CLAIMS

What is claimed is:

1. A dispersive spectrometer comprising:

a slit;

a primary lens to image a scene onto the slit, wherein light from a thin portion of the scene passes through the slit;

a collimating lens optically coupled to the slit to receive light from the thin portion of the scene;

a first grism optically coupled to the collimating lens to receive light from the thin portion of the scene, the first grism including a first diffractive element integral to a surface of the grism that disperses light from the thin portion of the scene in a first direction that is perpendicular to the major dimension of the thin portion of the scene, wherein light from the thin portion of the scene has an angle of incidence upon the first diffractive element that is greater than one-third of the critical angle at the surface of the grism; and

a focusing lens optically coupled to the first grism to receive light from the thin portion of the scene, wherein the focusing lens defines a focal plane onto which light from the thin portion of the scene is imaged.

2. The dispersive spectrometer of claim 1, wherein the first grism is formed of a material having an index of refraction that varies over a range of wavenumbers.

3. The dispersive spectrometer of claim 2, wherein the index of refraction of the first grism disperses light from the thin portion of the scene in the first direction.

4. The dispersive spectrometer of claim 2, wherein the index of refraction of the first grism disperses light from the thin portion of the scene in a second direction opposite the first direction.

5. The dispersive spectrometer of claim 1, wherein light from the thin portion of the scene enters the first grism through an entry surface, the first diffractive element being integral to the entry surface, and exits the first grism through an exit surface, having approximately a normal incidence upon the exit surface.

6. The dispersive spectrometer of claim 1, wherein light from the thin portion of the scene enters the first grism through an entry surface, having approximately a normal incidence upon the entry surface, and exits the first grism through an exit surface, the first diffractive element being integral to the exit surface.

7. The dispersive spectrometer of claim 1 further comprising a focal plane array disposed at the focal plane to detect light from the thin portion of the scene.

8. The dispersive spectrometer of claim 1 further comprising a prism optically disposed between the collimating lens and the first grism, wherein the prism disperses light from the thin portion of the scene either in the first direction or in a second direction opposite the first direction.

9. The dispersive spectrometer of claim 1 further comprising a prism optically disposed between the focusing lens and the first grism, wherein the prism disperses light from the thin portion of the scene either in the first direction or in a second direction opposite the first direction.

10. The dispersive spectrometer of claim 1 further comprising a second grism optically disposed between the collimating lens and the first grism, the second grism

including a second diffractive element, wherein the second diffractive element disperses light from the thin portion of the scene either in the first direction or in a second direction opposite the first direction.

11. A dispersive spectrometer comprising:

a slit;

a primary lens to image a scene onto the slit, wherein light from a thin portion of the scene passes through the slit;

a collimating lens optically coupled to the slit to receive light from the thin portion of the scene;

a grism optically coupled to the collimating lens to receive light from the thin portion of the scene, the grism including a diffractive element that disperses light from the thin portion of the scene in a first direction and a refractive element that disperses light from the thin portion of the scene in a second direction, wherein the first and second directions are perpendicular to the major dimension of the thin portion of the scene, and wherein light from the thin portion of the scene has an angle of incidence upon the diffractive element that is greater than one-third of the critical angle at the surface of the grism;

a focusing lens optically coupled to the first grism to receive light from the thin portion of the scene, wherein the focusing lens defines a focal plane onto which light from the thin portion of the scene is imaged; and

a focal plane array disposed at the focal plane to detect light from the thin portion of the scene in a predetermined spectrum.

12. The dispersive spectrometer of claim 11, wherein the first direction is opposite the second direction.

13. The dispersive spectrometer of claim 11, wherein light from the thin portion of the scene enters the grism through an entry surface, the first diffractive element being integral to the entry surface, and exits the grism through an exit surface, having approximately a normal incidence upon the exit surface.

14. The dispersive spectrometer of claim 11, wherein light from the thin portion of the scene enters the grism through an entry surface, having approximately a normal incidence upon the entry surface, and exits the grism through an exit surface, the first diffractive element being integral to the exit surface.